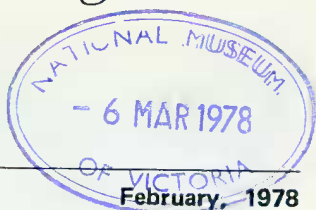


Australian Entomological Magazine

Aust. ent. Mag.



Volume 4, Part 5

A NEW SPECIES OF *CANDALIDES* FROM EASTERN AUSTRALIA AND NOTES ON *CANDALIDES HYACINTHINUS* (SEMPER) (LEPIDOPTERA: LYCAENIDAE)

By E. D. Edwards and J. F. R. Kerr

C.S.I.R.O. Division of Entomology, P.O. Box 1 700, Canberra City, A.C.T. 2601
and

29 Hipwood Road, Hamilton, Brisbane, Qld 4007

Abstract

Candalides geminus sp. n., a new species of *Candalides* Hübner sens. lat. belonging to the *erinus* species group is described from eastern Australia. A lectotype is selected for *Candalides hyacinthinus* (Semper) and *Candalides hyacinthinus hyacinthinus* is recorded from southern Western Australia.

Introduction

Two specimens resembling *C. hyacinthinus eugenia* Waterhouse and Lyell were taken at the Claudie River, Queensland, in May 1961. They differ from specimens of this subspecies from Kuranda and coastal localities south of Cairns, and were considered to be a far-northern form mentioned by Common and Waterhouse (1972). In February 1977 similar specimens were taken flying with *C. h. hyacinthinus* at Theodore in central Queensland which suggested that they might belong to a separate species. This was confirmed subsequently by the examination of many additional specimens and the genitalia. We consider it necessary to designate a lectotype for *Candalides hyacinthinus* in case some of its syntypes belong to *C. geminus* sp. n.

We have not used the generic name *Erina* Swainson for this group of species (Tite, 1963) and prefer to use *Candalides* sens. lat. at least until a generic name is proposed for the *C. absimilis* (Felder) group.

We take the opportunity to record the presence in southern Western Australia of *C. h. hyacinthinus*. This was first recognized when Mr K. T. Richards forwarded a specimen for identification and was subsequently independently recognized by Mr D. F. Crosby.

Because of individual variation a key to the adults of the *C. erinus* (Fabricius) group, based on coloration, would be cumbersome and that of Tite (1963) is unworkable. Examination of the genitalia may be necessary to distinguish worn specimens. Keys to the species of the *erinus* group, based on genitalia, are therefore given.

Key to the species of the erinus group based on male genitalia

1. Vesica with prominent, smooth spicule (D) 2
 Vesica without prominent spicule 3
2. Large hooked process dorsal to valva extending beyond the tip of
 the valva (B) *acastus* (Cox) (Figs 10, 15)
 Large hooked process absent *hyacinthinus* (Semper) (Figs 11, 16)
3. Valva narrow, tube like for more than two thirds of length
 *erinus* (Fabricius) (Figs 12, 14)
 Valva tapering gradually (C) *geminus* sp. n. (Figs 9, 13)

Key to the species of the erinus group based on female genitalia

1. Sinus vaginalis with a long tubular pouch *erinus* (Fabricius) (Fig. 20)
 Sinus vaginalis with compact pouch (E) 2
2. Sinus vaginalis with a more or less spherical pouch 3
 Sinus vaginalis with pouch rectangular to triangular in ventral view
 *geminus* sp. n. (Fig. 17)
3. Lamella antevaginalis developed (F) *acastus* (Cox) (Fig. 18)
 Lamella antevaginalis not developed *hyacinthinus* (Semper) (Fig. 19)

***Candalides geminus* sp. n. (Figs 1-4, 9, 13, 17)**

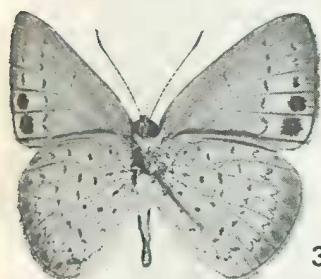
Types.— Holotype ♂ labelled "Captain Billy Creek, Cape York Pen., N. Qld. 142°50'E 11°05'S 12-14.VII.1975 J.F.R. Kerr", "Genitalia slide M 347", in Australian National Insect Collection (Registered Type No. 3281). 67♂, 42♀ paratypes: 1♂ "Blackdown Tableland Expedition Range, Qld. 7 December 1970 Andrew Atkins", 1♂ 2♀ with same label data but with dates "14 August 1971", "23 January 1971", "20 July 1973", the ♂ with "genitalia slide", 2♂ "Burra Range North Queensland 30 September 1974 Andrew Atkins", 2♂ "Iron Ra. Cape York Q. 13 April 1971 Andrew Atkins" (all in A. Atkins collection); 1♂ 1♀ "Carnarvon Rge. Q. 18 December 1938 N. Geary", "KL 22071" "Austr. Mus. Collection", 1♂ "Cape York Q. 16-3-06 Coll. Waterhouse" "KL 22061" "G. A. Waterhouse Collection", 1♀ "Cape York 3-11-10 H. Elgner" "KL 22062" "G.A. Waterhouse Collection", 1♂ "Warrumbungles, NSW 19-23 Jan. 1971 H.G. Smithers" "Genitalia slide", 3♀ "Warrumbungles Nat. Pk. NSW 1-2-69 J.V. Peters" one with "genitalia slide", (all in Australian Museum); 1♀ "Barryrenie 3-10-61 H.S. Thirkell" "genitalia slide M 342" 1♂ "Claudie River Cape York Pen. May, 1961 J.F.R. Kerr" "Genitalia tube 192", 1♂ "15.18S 145.01E 31 km NW by W of Cooktown Qld 250 m 22 May 1977 I.F.B. Common & E.D. Edwards", 1♂ 1♀ with same label data but dated "20 May 1977", ♂ with "genitalia slide M 333", 1♂ 9♀ "31.07S 149.40E 40 km ENE Coonabarabran N.S.W. 2 Oct. 1977 E.D. Edwards", 6♂ 5♀ "32.06S 148.34E 19 km N by W of Dubbo NSW 1 Oct. 1977 E.D. Edwards", 1♂ "30 km S Theodore Qld. 1 Feb. 1977 J.F.R. Kerr" "genitalia slide M 346", 1♀ "Silver Plains Homestead, Cape York Pen. Q. 11 Feb. 1960 J.L. Wassell" (all in Australian National Insect Collection); 1♂ "Eidsvold 13 Mar. 1976 M. De Baar", 2♂ "Leo Creek Road, ca. 500 m, McIlwraith Range 30 km NE of Coen, N. Qld June 29 - July 4, 1976 M. De Baar" (all in M. De Baar collection); 1♂ 2♀ "2 km NE Mt. Tozer, Cape York Pen., 10 Sept. 1977 D. Binns", 1♂ "Iron Range C.Y. Pen. N. Qld 4 Sept. 1977 D. Binns" (all in D. Binns collection); 1♂ 1♀ "32.06S 148.34E 19 km N by W of Dubbo N.S.W. 1 Oct. 1977 E.D. Edwards" male with "genitalia slide M 348", 1♂ "N. Queensland: York Penin. Olive River 12.viii.1923 J.E. Young" "W.A.I. Exp. Brit. Mus. 1923-412" in British Museum (Natural History); 1♂ 1♀ "Blackdown Tableland Expedition Range C. Qld. 8 Nov. 1974 G. Daniels", 1♂ 1♀ "4 ml W. Browns Ck. Coen - Iron Range Rd. N. Qld.



1



2



3



4



5



6



7



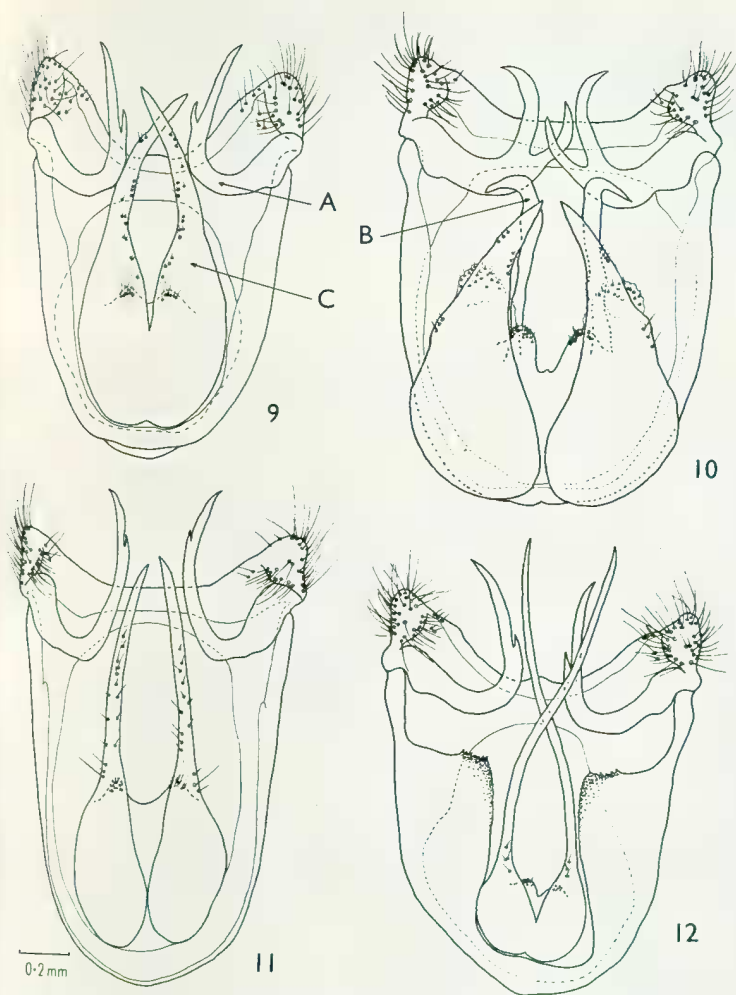
8

FIGS 1-8. (1, 3) upper and underside holotype ♂ *C. geminus* sp. n.; (2, 4) upper and underside paratype ♀ *C. geminus* sp. n., 31 km NW by N of Cooktown, Q.; (5, 6) underside ♂ and ♀ *C. hyacinthinus hyacinthinus*, Palmwoods, Q.; (7, 8) underside ♂ and ♀ *C. erinus*, Rockhampton, Q., Yeppoon, Q.

13 Sept. 1974 G. Daniels" (all in G. Daniels collection); 1♂ "Claudie R., Cape York, May 1961, J.F.R. Kerr", 10♂ 2♀ "Captain Billy Creek, Cape York Pen. N. Qld. 142°50'E 11°45'S 12-14.VII.1975 J.F.R. Kerr", 1♂ 1♀ "31.07S 149.40E 40 km ENE Coonabarabran N.S.W. 2 Oct. 1977 E.D. Edwards", 1♂ "Eidsvold, Q. 7 March 1971 J.F.R. Kerr", 1♂ "Eidsvold, Q. 17 Feb. 1974 J.F.R. Kerr", 1♂ "30 km S Theodore, Qld. 1 Feb. 1977 J.F.R. Kerr", 1♂ "22 mls S Theodore, Q. 21 Oct. 1973, J.F.R. Kerr" (all in J.F.R. Kerr collection). 2♂ "Claudie River Nth Q., 15-16.V.1961 J. Macqueen", 2♂ "Isla Gorge S.Q. 3-4 March 1973 J. Macqueen", (all in J. Macqueen collection); 4♂ "Heath country approx. half way between Iron Range and Portland Roads N.Q. 13 Apr. 1971 M.S. Moulds", 1♀ "Coen N.Q. 11 Jan. 1969 M.S. Moulds", 1♀ "Tozer Gap, Iron Range, N.Q. 12 Oct. 1974 M.S. Moulds", 1♀ "Old Lockhart River Mission Site, Iron Range, N.Q. 26 Oct. 1974 M.S. & B.J. Moulds", 1♂ "Coonabarabran N.S.W. 8 Jan. 1963 M.S. Moulds" (all in M.S. Moulds collection); 1♂ 1♀ "Iron Range, Q. C.G. Miller" dated "22 Sept. 1975" and "27 Sept. 1975", 1♂ "Tozers Gap, Iron Range, Q. 26 Sept. 1975 C.G. Miller", 4♂ 2♀ "Iron Range, Cape York Pen., N. Qld. C.G. Miller" 4 dated "4 August 1977" and 2 dated "6 August 1977" (all in C.G. Miller collection); 1♂ "Cape York, N.Q. 6-6-28 W.B. Barnard" "Candalides hyacinthinus eugenia ♂", 1♂ "Cape York, N.Q. 25-10-27 W.B. Barnard" (all in Queensland Museum); 1♂ 2♀ "Claudie R. N.Q. December 1971 D. Sands" one ♀ with "genitalia slide", 1♂ "Eidsvold Qld 13-ii-71 D.P. Sands (all in D.P. Sands collection); 2♀ "C. York 16-10-27" "Presented by E.J. Dumigan 1966", 1♂ "Cape Flattery Heath 45 km N Cooktown Q. 13-14 July 1976 G.B. & S.R. Monteith", 1♂ "Sandstone hilltop 12 km N of Hopevale, N. Qld. 15 July 1976 G.B. & S.R. Monteith" "Genitalia slide", 1♂ "Lockerbie area Cape York N. Qld 13-27 Apr 1973 G.B. Monteith" (all in University of Queensland collection).

Distribution:— The species occurs from Cape York, Qld, to Barryrenie, near Cowra, N.S.W. It is not recorded from coastal districts south of Cooktown, Qld and in New South Wales it is only known from areas west of the Dividing Range.

Description:— *Holotype male* (Figs 1, 3). Head dark grey; frons white with two vertical bars of dark grey; projecting scales dark grey; antennae black with white bands on under surface; labial palpi black above, white at base of terminal segment, white beneath with projecting scales dark grey. Thorax dark grey above and white beneath; legs white, suffused with grey scales; tarsal segments dark grey ringed with white. Abdomen dark grey above and white beneath. Fore wing above shining purplish brown; apex brown black; termen and costa narrowly brown black; veins brown black; cilia grey; dagger scales scattered over the median two thirds. Fore wing beneath pale grey; a faint grey bar at end of cell; a narrow postmedian line of dark grey dashes extending from R_5 to $1A+2A$, which are straight or bowed inwards, that between CuA_2 and $1A+2A$ bowed outwards; subterminal line of dashes extending from R_5 to $1A+2A$, that between M_3 and CuA_1 slightly larger, surrounded by a white suffusion which extends proximally to the postmedian line, the two markings between CuA_1 and $1A+2A$ much larger, appearing as large black spots surrounded by a white suffusion which extends proximally to the postmedian line; termen narrowly darker; cilia pale grey. Hind wing above shining purplish brown; costa brown black; termen narrowly brown black; inner margin dark grey; cilia grey; inner margin and base lightly clothed with silvery hair scales. Hind wing beneath pale grey, paler towards inner margin and between postmedian and subterminal lines, darker between subterminal line and termen; two brown black dots within cell, inner with a similar dot above it between $Sc + R_1$ and $Rs + M_1$ and a dot below between CuA_2 and $1A + 2A$, the latter two dots narrowly surrounded by white; median line of grey brown dots and dashes, two at end of cell and one between $Sc + R_1$ and Rs , CuA_1 and CuA_2 , CuA_2 and $1A + 2A$ and between $1A + 2A$ and inner margin, dots nearest costa and inner margin narrowly surrounded with white; postmedian line of dashes grey brown extending from $Sc + R_1$ to inner margin, that nearest inner margin displaced proximally; subterminal line of scattered black scales, narrow, from $Sc + R_1$ to inner margin, bowed inward between veins; termen narrowly dark grey; cilia pale grey; basal area lightly clothed with silvery hair scales; dagger scales scattered over the discal area. Length of fore wing 15mm.



FIGS 9-12. Ventral view of male genitalia with aedeagus removed: (9) holotype *C. geminus* sp. n.; (10) *C. acastus*, Black Mt., A.C.T.; (16) *C. hyacinthinus hyacinthinus*, Batemans Bay, N.S.W.; (12) *C. erinus*, Ingham, Q.

Males in the paratypic series show considerable variation in the shade of purple above ranging from shining purplish brown to shining purple. The former are usual in northern localities and the latter in southern localities. The width of the brown black margins above also varies. The ground colour beneath in a specimen from Blackdown Tableland, Qld, is almost as dark as in *C. hyacinthinus* and the white areas around the large black spots are present. Length of fore wing 13-17 mm.

Male genitalia (Figs 9, 13). Valva robust, tapering gradually to point; aedeagus narrow, slightly broader at tip; vesica without prominent spicule. Male genitalia vary in the shape of

the basal halves of the valvae; those of the holotype (Fig. 9) are considerably narrower than in most specimens, and in this respect might be mistaken for *C. hyacinthinus*.

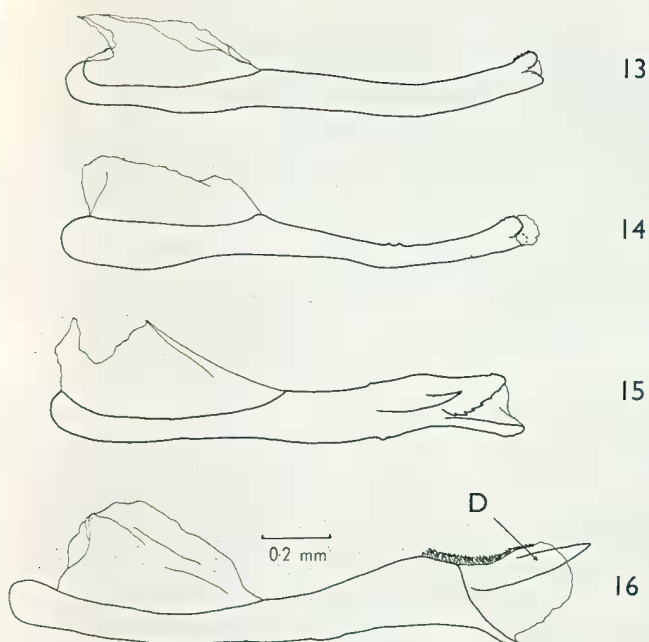
Female (Figs 2, 4). Head, thorax and abdomen as in male. Fore wing above brown black, shining purple between CuA_2 and dorsum except for broad terminal band, scattered purple scales in cell and between CuA_1 and CuA_2 , scattered blue scales at base, patches of black scales corresponding to large black spots beneath. Fore wing beneath as in male. Hind wing above brown black, shining purple between M_1 and $1A + 2A$ except for broad terminal band, scattered pale blue scales at base; basal half sparsely clothed with long silvery hair scales. Hind wing beneath as in male. Females vary in the extent of purple above, some examples having purple only between CuA_2 and $1A + 2A$ on the hind wing. Length of fore wing 14-17 mm.

Female genitalia (Fig. 17). Sinus vaginalis forming a broadly rectangular to triangular pouch.

Comments.— Both sexes of *C. geminus* may be distinguished from *C. hyacinthinus* (Figs 5, 6) by the markings beneath which are dots and dashes and never blotches as in *C. hyacinthinus*. The markings at the end of the hind wing cell beneath are dashes in *C. geminus* whereas in *C. hyacinthinus* they are blotches with darker margins. The large black spots on the underside of the fore wing are almost always surrounded by white in *C. geminus* and the ground colour on the underside of *C. hyacinthinus* is browner. Males may be distinguished by the more rounded termen of the fore wing and the less pointed tornus of the hind wing in *C. geminus*. The valvae in *C. geminus* taper more gradually to a point, the lobes of the uncus are more protruded and the bifurcation of the brachium is further from the tip (A). The aedeagus is distinctive, being narrower, less expanded towards the tip than in *C. hyacinthinus* and the vesica is without the prominent and smooth spicule of that species. Females of *C. hyacinthinus* sometimes have extensive purple areas in the cell and between M_1 and CuA_2 of the fore wing but such coloration has not been found in females of *C. geminus*. Occasionally females of the subspecies *C. hyacinthinus hyacinthinus* have the purple replaced by blue but this has not been observed in *C. geminus*. Dark patches above corresponding to the large black spots on the underside of the fore wing are more noticeable in females of *C. geminus*. The sinus vaginalis forms a broadly rectangular to triangular pouch in *C. geminus*, whereas in *C. hyacinthinus* it is spherical.

Both sexes may be distinguished from *C. erinus* (Fabricius) (Figs 7, 8) by their larger size (*C. erinus*: ♂ 11-14 mm, ♀ 12-14 mm). *C. erinus* is whiter on the underside and the markings are more brownish. In *C. erinus* the postmedian line of markings on the underside of the hind wing is almost straight between M_2 and $1A + 2A$, whereas in *C. geminus* it is curved. Males may be distinguished by the valvae which are broad and taper gradually to a point while in *C. erinus* they are long and very narrow. Females may be distinguished by the purple areas above which are rarely present in Australian examples of *C. erinus*. In *C. erinus* the pouch of the sinus vaginalis is very greatly lengthened.

Candalides geminus has occasionally been mistaken for *C. hyacinthinus eugenia* in the past. Common (1964) based the locality record of Port Stewart for *C. hyacinthinus eugenia* on a female specimen of *C. geminus* and Peters (1969), followed by Common and Waterhouse (1972) and other authors,



FIGS 13-16. Aedeagus: (13) holotype *C. geminus* sp. n.; (14) *C. erinus*, Ingham, Q.; (15) *C. acastus*, Black Mt., A.C.T.; (16) *C. hyacinthinus hyacinthinus*, Batemans Bay, N.S.W. (with vesica partly extruded).

extended the range of *C. hyacinthinus eugenia* to Cape York based on two specimens of *C. geminus* in the Australian Museum from the G. A. Waterhouse collection. Dr G. A. Waterhouse never recorded *C. hyacinthinus eugenia* from north of Kuranda and apparently regarded the specimens as large *C. erinus*. Smithers and Peters (1972) and Atkins (1974) correctly recorded *C. h. hyacinthinus* at the Warrumbungle National Park, N.S.W. and Expedition Range, Qld, respectively, but specimens of *C. geminus* were taken at the same time. *C. geminus* is mentioned as *Candalides* sp. by Monteith and Hancock (1977).

On Cape York Peninsula *C. geminus* has been collected flying near *Cassythia* sp. (Cassythaceae) growing in open forest plant communities. Near Dubbo it was found in the *Melaleuca uncinata* R.Br. subassociation of the *Eucalyptus viridis* R.T. Baker association (Biddiscombe 1963) and near Coonabarabran in dry sclerophyll forest where a female was observed laying eggs on *Cassythia paniculata* R.Br.

Adults have been taken flying with *C. erinus* on Cape York Peninsula and with *C. hyacinthinus* at Expedition Range, Theodore and near Coonabarabran. Its range is not yet known to overlap that of *C. acastus* (Cox). *C. geminus* has been caught on Cape York Peninsula in all months except January and February and it almost certainly occurs throughout the year. At Expedition Range it has been taken in July and August as well as other months and may occur throughout the year. In southern Queensland and New South Wales it has been taken from October to March.

***Candalides hyacinthinus hyacinthinus* (Semper)**

Holochila hyacinthina Scott in litt. Semper, 1879

Candalides simplex cassythae (Scott) Couchman, 1962

Erina hyacinthina hyacinthina (Semper) Tite, 1963

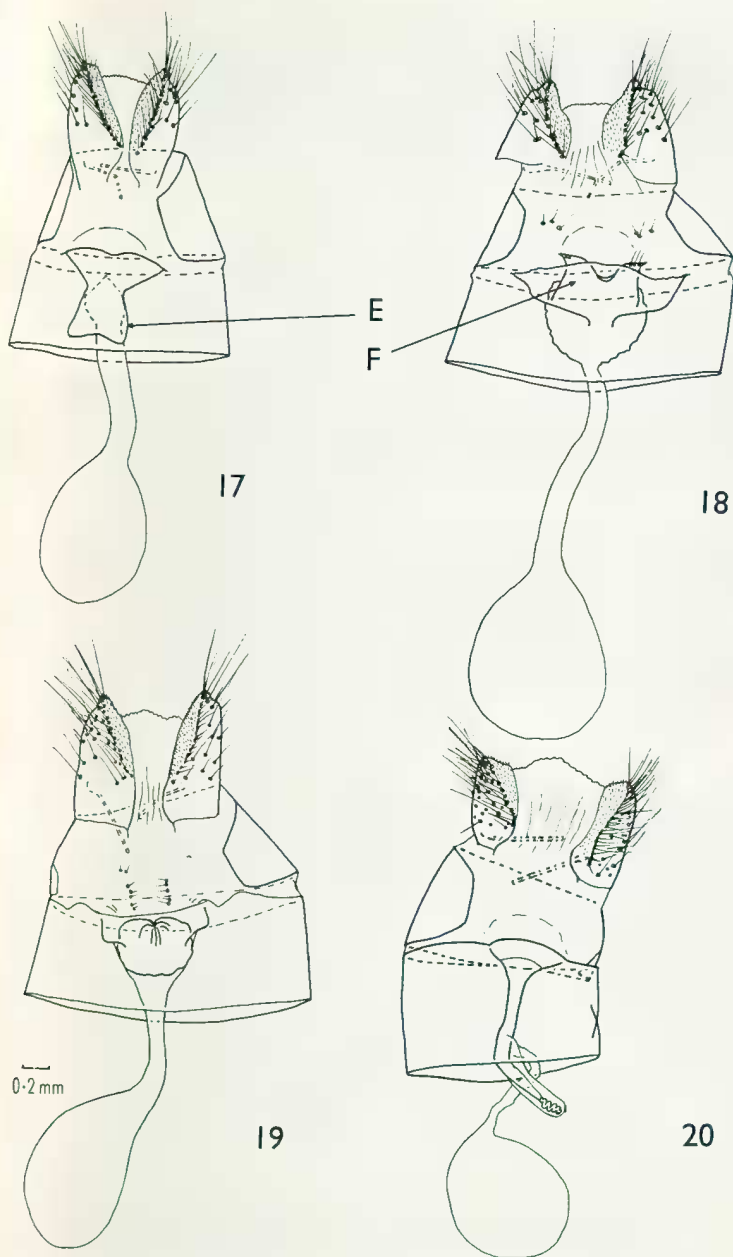
Candalides hyacinthinus hyacinthinus (Semper) Common and Waterhouse, 1972

Types:— Lectotype ♀ labelled "Sidney", "Semper Coll. 1897", "ex coll. Hamilton Druce, 1919", "Joicey Bequest Brit. Mus. 1934-120", "Syntype", "*Holochila hyacinthina* (Scott i.l.) Semper det. R. I. Vane-Wright, 1977 Syntype ♀" hereby designated, in British Museum (Natural History); 1♂ paralectotype labelled "Rockhampton", "Semper Coll. 1897", "ex coll. Hamilton Druce, 1919", "Joicey Bequest Brit. Mus. 1934-120" "Syntype", "*Holochila hyacinthina* Scott i.l.", "*Holochila hyacinthina* (Scott i.l.) Semper det. R. I. Vane-Wright, 1977 Syntype ♂" in British Museum (Natural History).

Comments:— A more complete synonymy can be found in Couchman (1962). Semper (1879) described the species from at least six specimens if the specimen figured by Herrich-Schäffer (1869) as *Lycaena erinus* is included. The specimens came from Sydney and Rockhampton. He did not designate a holotype and subsequent authors have not designated a lectotype. To check that the name *C. hyacinthinus* (Semper) has been correctly applied it was necessary to trace the syntypes and only two were found, both in the British Museum (Natural History); one from each locality. The specimen from Sydney, a female, was chosen as lectotype to conserve existing nomenclature as specimens from Rockhampton are included with *C. h. eugenia*. The holotype of *C. h. eugenia* in the Australian Museum has been examined and is correctly placed with that species. We were also able to examine a photograph of the holotype of *Papilio erinus* Fabricius in the British Museum (Natural History) and a syntype of *Polyommatus subpallidus* T. P. Lucas in the South Australian Museum labelled "Brisbane Lucas Coll" "I 13444 *Candalides subpallida* Lucas TYPE" and four other syntypes and confirm the application of these names by Waterhouse (1903) and subsequent Australian authors.

In our opinion *C. h. eugenia*, typically from Kuranda, represents the end of a cline running up the Queensland coast with northern specimens paler and greyer beneath. *C. h. eugenia* is not known from north of Kuranda.

Common and Waterhouse (1972) gave the range of *Candalides hyacinthinus simplex* (Tepper) as coastal southern Western Australia south to Margaret River. The inclusion of Margaret River was based on a pencilled note by Dr A.J. Turner. Specimens have also been taken at Westonia, Fitzgerald River Reserve, Salmon Gums and, by Mr D. F. Crosby, in the Stirling Range. Specimens of *C. h. hyacinthinus* have now been taken in southern Western Australia at the Porongorups, Manjimup, Warren River 6 miles S.E. of Pemberton, Jewel Cave Augusta, Karridale, Margaret River and Smiths Mill (Glen Forest). Sixteen males and eight females, taken from October to January, have been examined. We think it unsuitable to nominate a subspecific name for this population in which some specimens cannot be easily distinguished from eastern *C. h. hyacinthinus*. Nevertheless many specimens are smaller and browner beneath than those from the east and in many the markings of the postmedian line on



FIGS 17-20. Ventral view of female genitalia: (17) paratype *C. geminus* sp. n., Claudie R., Q.; (18) *C. acastus*, Black Mt., A.C.T.; (19) *C. hyacinthinus hyacinthinus*, Hawk-sbury Lookout, N.S.W.; (20) *C. erinus*, Townsville, Q.

the underside of the hind wing tend to fuse and spread towards the base. Males are usually more brown above than eastern *C. h. hyacinthinus*. The spicule on the vesica is usually shorter than that of eastern specimens. The specimen from Smiths Mill is indistinguishable from eastern specimens. We have not seen specimens of *C. h. simplex* from the area of southern Western Australia where *C. h. hyacinthinus* is now known to occur and a more detailed knowledge of the distributions of both would be of interest.

Acknowledgements

The following people have kindly made specimens available to us for study either from their own collections or collections in their care: Mr A. Atkins, Mr M. De Baar, Mr D. Binns, Mr D. F. Crosby, Mr S. J. Curry, Mr E. C. Dahms (Queensland Museum), Mr G. Daniels, Mr G. F. Gross (South Australian Museum), Mr G. A. Holloway (Australian Museum), Mr J. Macqueen, Dr C. G. Miller, Mr G. B. Monteith (Department of Entomology, University of Queensland), Mr M. S. Moulds, Mr K. T. Richards (Western Australian Department of Agriculture), Mr D. P. Sands, Dr C. N. Smithers (Australian Museum) and Mr R. I. Vane-Wright (British Museum (Natural History)). We are particularly indebted to Mr R. I. Vane-Wright and Mr D. P. Sands who kindly located and photographed type material in the British Museum (Natural History). Mr D. F. Crosby generously donated material to the Australian National Insect Collection. We also thank Dr I. F. B. Common for comments and Mr J. P. Green for the photographs and Mr L. G. Adams for identifying the foodplant.

References

- Atkins, A., 1974. Butterflies of Expedition Range, Central Queensland. *Victorian Ent.* 4: 9-14.
- Biddiscombe, E. F., 1963. *A vegetation survey of the Macquarie region, New South Wales*. Division of Plant Industry Technical Paper No. 18. C.S.I.R.O., Melbourne.
- Common, I. F. B., 1964. *Australian butterflies*. Jacaranda Press, Brisbane.
- Common, I. F. B. and Waterhouse, D. F., 1972. *Butterflies of Australia*. Angus and Robertson, Sydney.
- Couchman, L. E., 1962. Notes on some Tasmanian and Australian Lepidoptera-Rhopalocera. *Pap. Proc. R. Soc. Tasm.* 96: 73-81, 1 pl.
- Herrich-Schäffer, G. A. W., 1869. Neue Schmetterlinge aus dem "Museum Godeffroy" in Hamburg. *Stettin. ent. Ztg* 30: 65-80, pls 1-4.
- Monteith, G. B. and Hancock, D. L., 1977. Range extensions and notable records for butterflies of Cape York Peninsula, Australia. *Aust. ent. Mag.* 4: 21-37.
- Peters, J. V., 1969. Notes on the distribution of Australian Hesperioidea and Papilionoidea (Lepidoptera). *Aust. Zool* 15: 178-184.
- Semper, G., 1879. Beitrag zur Rhopalocerenfauna von Australien. *J. Mus. Godeffroy* 14: 138-194, pls 8, 9.
- Smithers, C. N. and Peters, J. V., 1972. Butterflies observed in Warrumbungle National Park, N.S.W. *Aust. ent. Mag.* 1: 11-12.
- Tite, G. E., 1963. A revision of the genus *Candalides* and allied genera (Lepidoptera: Lycaenidae). *Bull. Br. Mus. nat. Hist. (Ent.)* 14(5): 197-259, 4 pls, 119 text-figs.
- Waterhouse, G. A., 1903. Notes on Australian Rhopalocera: Lycaenidae. Part III. Revisional. *Proc. Linn. Soc. N.S.W.* 28: 132-275, pls 2, 3.
- Waterhouse, G. A. and Lyell, G., 1914. *The butterflies of Australia*. Angus and Robertson, Sydney.